

5. General Description of the Fire Problem

<u>Asset at Risk</u>	<u>Public Issue Category</u>	<u>Location and ranking methodology</u>
Hydroelectric power	Public welfare	1) Watersheds that feed run of the river power plants, ranked based on plant capacity; 2) cells adjacent to reservoir based plants (Low rank); and 3) cells containing canals and flumes (High rank)
Fire-flood watersheds	Public safety Public welfare	Watersheds with a history of problems or proper conditions for future problems (South Coastal Plain, field/stakeholder input), ranked based on affected downstream population
Soil erosion	Environment	Watersheds ranked based on erosion potential
Water storage	Public welfare	Watershed area up to 20 miles upstream from water storage facility, ranked based on water value and dead storage capacity of facility
Water supply	Public health	1) Watershed area up to 20 miles upstream from water supply facility (High rank); 2) grid cells containing domestic water diversions, ranked based on number of connections; and 3) cells containing ditches that contribute to the water supply system (High rank)
Scenic	Public welfare	Four mile viewshed around Scenic Highways and 1/4 mile viewshed around Wild and Scenic Rivers, ranked based on potential impacts to vegetation types (tree versus non-tree types)
Timber	Public welfare	Timberlands ranked based on value/susceptibility to damage
Range	Public welfare	Rangelands ranked based on potential replacement feed cost by region/owner/vegetation type
Air quality	Public health Environment Public welfare	Potential damages to health, materials, vegetation, and visibility; ranking based on vegetation type and air basin
Historic* buildings	Public welfare	Historic buildings ranked based on fire susceptibility (no data for this asset)
Recreation	Public welfare	Unique recreation areas or areas with potential damage to facilities, ranked based on fire susceptibility
Structures	Public safety Public welfare	Ranking based on housing density and fire susceptibility
Non-game wildlife*	Environment Public welfare	Critical habitats and species locations based on input from California Department of Fish and Game and other stakeholders (no data for this asset)
Game wildlife	Public welfare Environment	Critical habitats and species locations based on input from California Department of Fish and Game and other stakeholders
Infrastructure	Public safety Public welfare	Infrastructure for delivery of emergency and other critical services (e.g. repeater sites, transmission lines)
Ecosystem Health*	Environment	Ranking based vegetation type/fuel characteristics (No methodology for this asset)

The Assessment Process for Level of Service, Hazardous Fuels and Severe Weather

A system of scaling was designed to break down the vast geographic areas to be assessed statewide. The analysis was linked to a common map source; USGS 7.5 minute quads. These maps were then divided into a 9X9 grid, resulting in 81 cells, referred to as “Quad 81st”. Each cell is approximately 450 acres in size. Evaluation criteria are applied to each area and numerical rankings are entered for each Q81st, resulting in priority rankings for Level of Service, Assets at Risk, Hazardous Fuels and Severe Fire Weather. These four assessments are then used to analyze the local fire problem, identify the high-risk/high-value areas and assist in suggesting pre-fire management solutions.

The high-value assessment, **Assets at Risk**, was detailed in the previous section. Following are detailed descriptions of the three high-risk assessments:

A. Level of Service assessment focuses on identifying areas with the potential of unacceptable loss and high-cost fires due to fire frequency and inadequate staffing levels.

B. Fuel Hazard assessment evaluates current flammability of a particular fuel type, given location on the slope, average bad weather conditions, ladder fuels, and crown density.

C. Severe Weather assessment determines the number of days during declared fire season that geographic areas within the county experience severe fire weather.

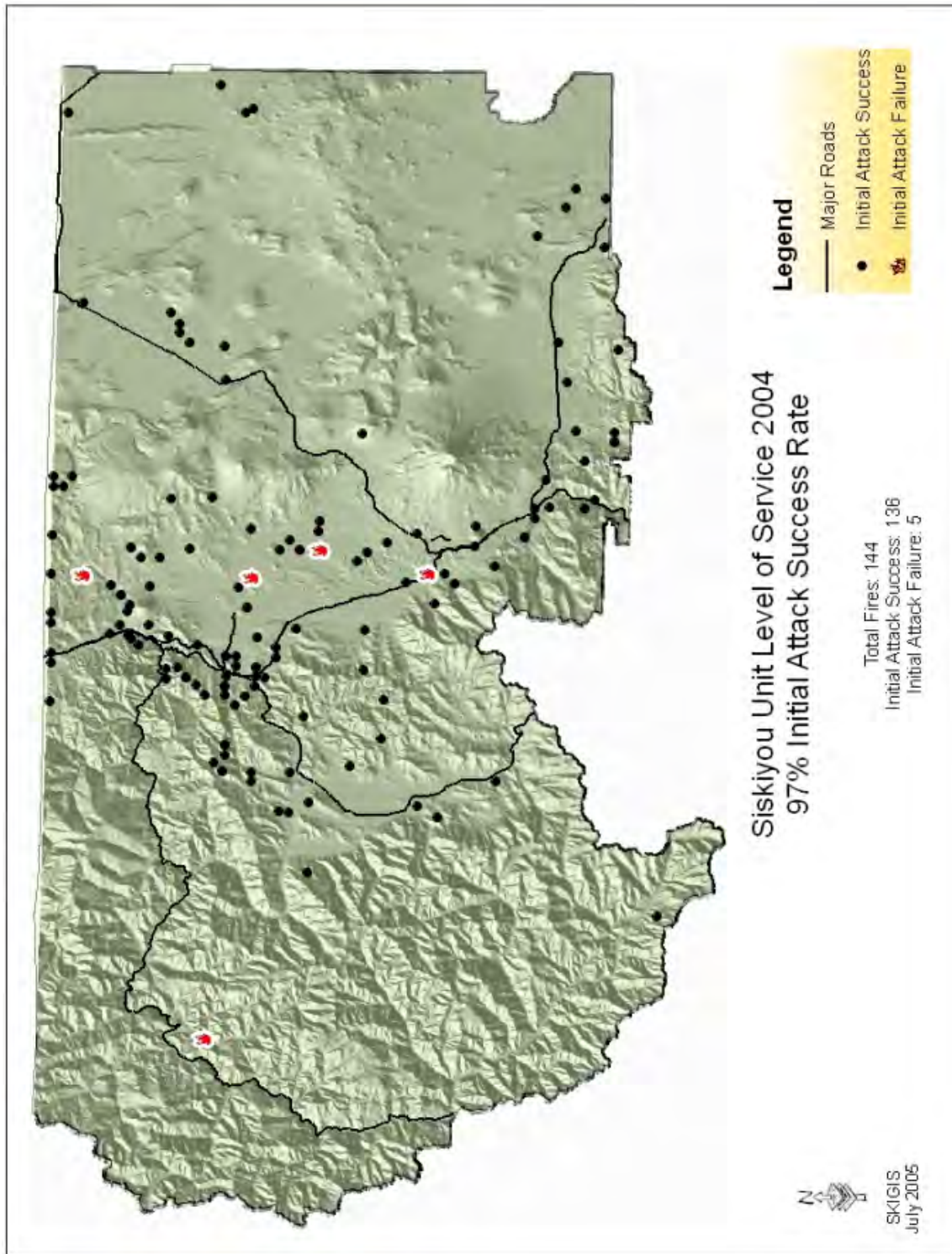
A. *Level of Service Assessment*

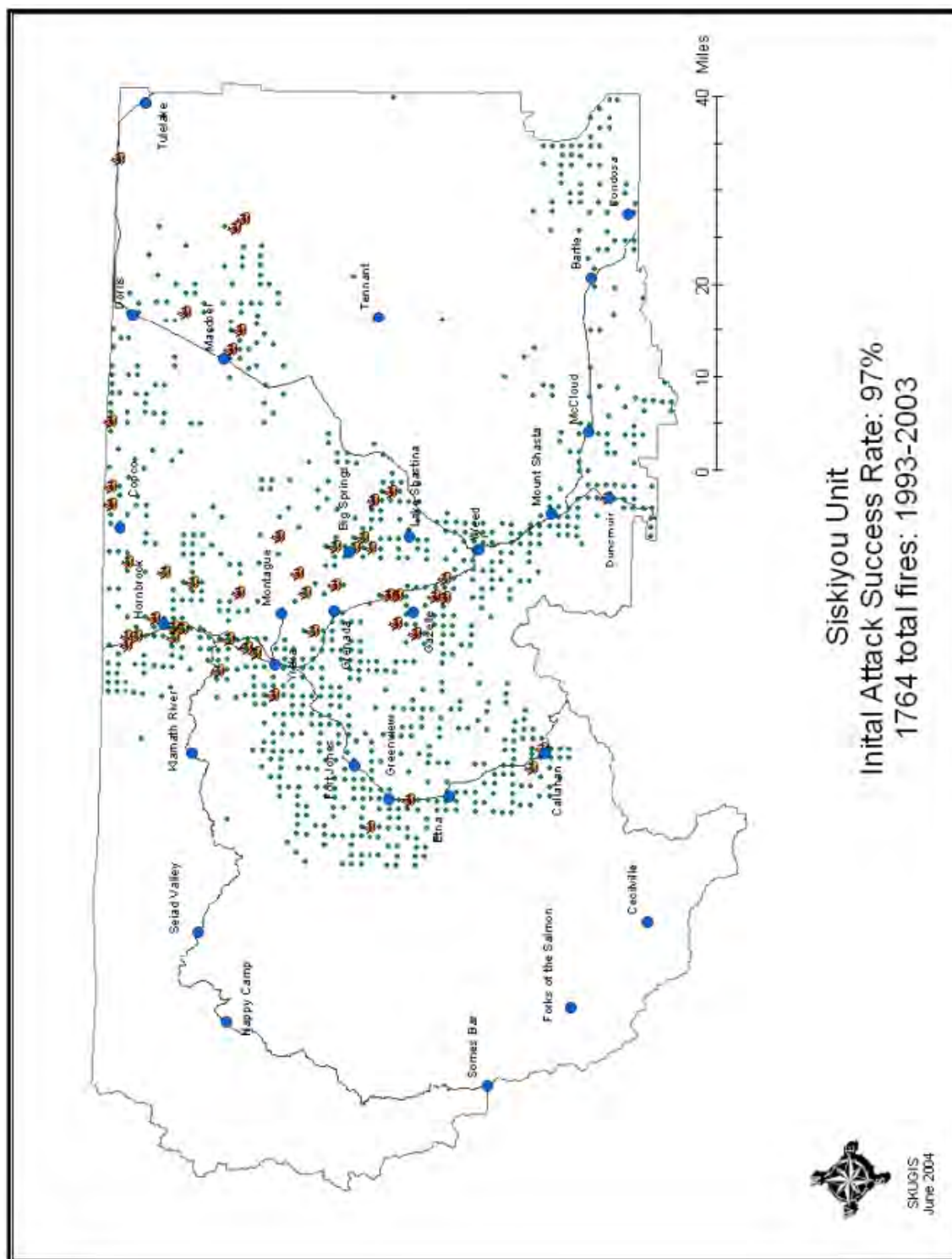
The Level of Service assessment focuses on identifying areas with the potential of unacceptable loss and high-cost fires due to fire frequency and inadequate staffing levels.

Tasked by the legislature through Public Resources Code 4130 to provide an equal level of protection to lands of similar type, CDF recognizes the need for a process to define a level of service. It is difficult to draw a true performance based picture, given the complexity of the fire environment. The current level of service rating has been established using GIS data, a 10-year history of fires, the assets damaged and severity of burning. The rating is expressed as a ratio comparing successful efforts to total fire starts. “Success”, is defined as those fires controlled without additional resources beyond initial attack. Also factored into the success rating is the amount of damage, cost to control, and final fire size by fuel type. It is important to note, some fires, fought in severe weather conditions, can be termed successful though the final acreage exceeds the cut-off minimums. This emphasizes the idea of Level of Service as an approximation and points up its value as a tool for analysis, rather than an absolute.

In the 10 year analysis of ignitions it was found that Siskiyou enjoys a 98% overall success rate. Study of those 450 acre areas containing more than 10 starts during the period analyzed, supported a known escape debris burn problem in one community and a railroad cause problem in another, which has been mitigated. The remaining high incidence areas contained fires that were lightning caused.

The initial attack workload assessment is displayed on the following maps with statistical data related to these maps. Initial attack points of origin are plotted and color-coded based on success-failure scores. Some of the successes and failures are not matched to weather. Further validations will need to be refined and completed to make these matches in the future.





B. Fuel Hazard Assessment

Fire Fuels

The fuel assessment layer exemplifies the local fire hazard situation. This assessment is a very useful tool, allowing pre-fire planners and fire safe councils to target critical areas for pre-fire fuel treatment.

The fuel hazard assessment evaluates current flammability of a particular fuel type, using: location on the slope, average bad weather conditions, ladder fuels, and crown density. Fuel, in the context of wildland fire, refers to all combustible material available to burn within a given area of land. Grass, brush and timber are the most common fuels found in the greater Siskiyou County ecosystem. Each fuel has its own burning characteristics based on several inherent factors. These factors include moisture content, volume, live to dead vegetation ratio, size, arrangement and the plant's genetic make up. All of these contribute to a fire's spread, its intensity, and ultimately, its threat to assets. Fuel loading is measured in tons per acre. Grass is considered a light fuel with approximately $\frac{3}{4}$ of a ton per acre. On the other end of the spectrum, thick brush, a heavy fuel, can have a volume of over 21 tons per acre. Fire intensity is also directly related to fuel loading. Grass burns rapidly with a short period of intense, maximum heat output. Brush, on the other hand, has a long sustained high heat output making it more difficult to control. With this in mind it is prudent to identify areas containing heavy concentrations of fuel and target these areas for hazard reduction.

Fuel arrangement is critical in wildland fire behavior, as it is linked to how readily the fuel burns and hence a fire's spread. Non-compacted fine fuels, such as grass, spread fire rapidly since more of its surface can be heated at one time. Compacted fuels, such as pine litter, on the other hand burn slower because heat and air only reaches the top of the fuel.

Vertical arrangement refers to the continuity of fuel from the forest floor to the tree canopy. The vertical arrangement of fuels is known as ladder fuels; they are an extremely influential factor in fire spread and behavior often turning a ground fire into a crown fire.

Crown or canopy closure refers to the density of a forest created by treetops, and is very important in the lateral progression of fire through the forest canopy.

Hazardous Fuels Assessment

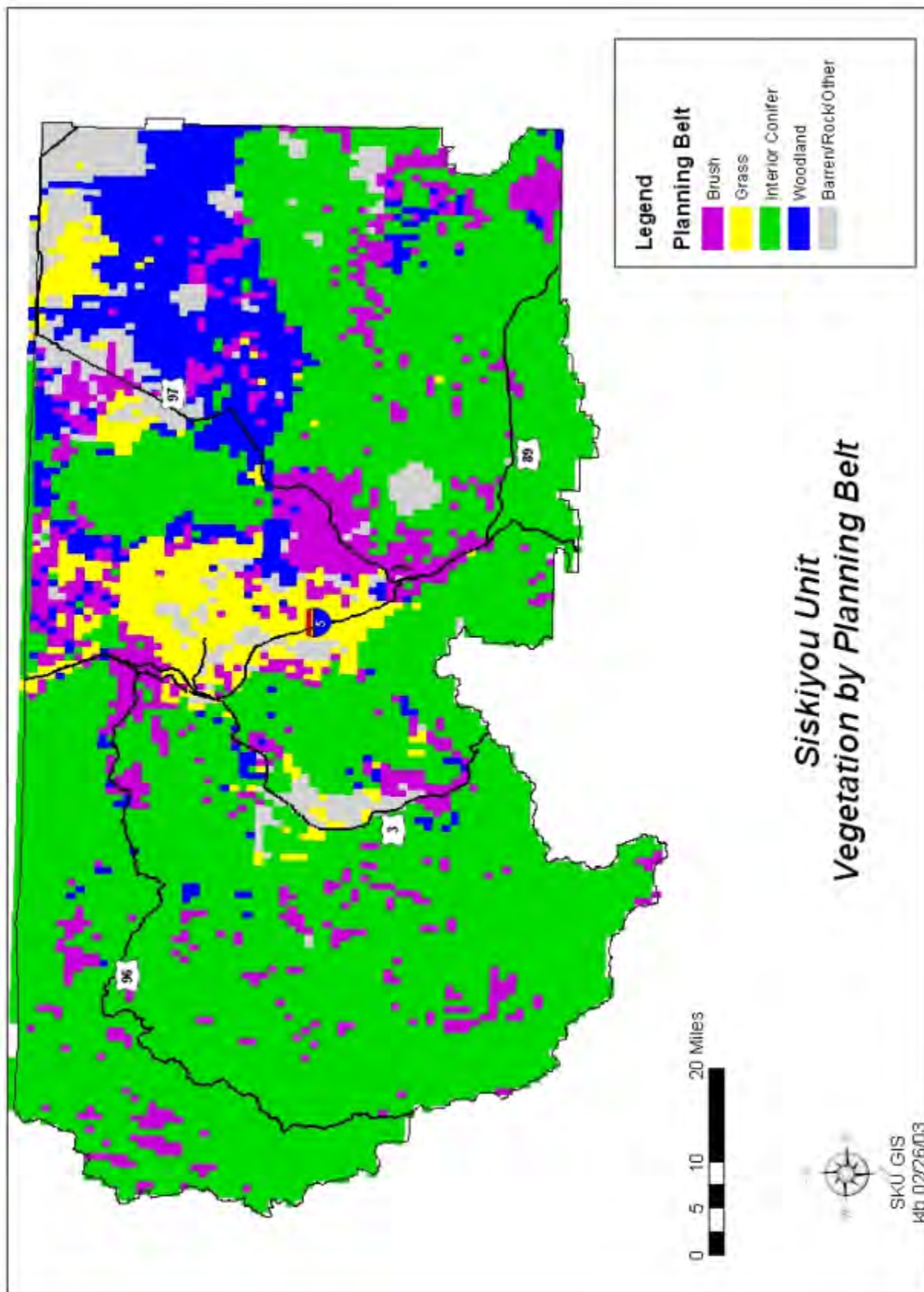
The first step in defining hazardous fuels is the development of a vegetation coverage layer for Siskiyou Unit using GIS. Planning belts have been established to classify the 13 fuel types into four general areas: grass, brush, timber, and woodland. These areas have similar fire behavior characteristics that impact fire suppression activities. The vegetation within the planning belts is then categorized into the fuel model coverage as described in the National Wildfire Coordinating Group Fuel Models detailed in the appendix. After the vegetation coverage was completed, Arcview GIS was used to display the vegetation coverage overlaid with the unit's fire history. Through analysis, the impact on surface fuel characteristics as a result of past fires was factored into the creation of a final vegetation layer. The final product is a more accurate account of the current "post fire" vegetation coverage throughout the unit.

The final phase of determining fuel hazard ratings for the Siskiyou Unit involves the combining of crown fuel characteristics and surface fuel characteristics. The presence of these characteristics indicate the probability that torching and crown fire will occur if the stand were subjected to a wildfire under adverse environmental conditions.

The basic fuels assessment method calculates expected fire behavior for unique combinations of topography and fuels under a given weather condition. The BEHAVE Fire Behavior Prediction System (FBPS)(Andrews 1986) provides estimates of fire behavior under severe fire weather conditions for each of the FBPS fuel models. The potential fire behavior drives the hazard ranking. The final hazard ratings are moderate, high or very high.

Knowledge of fire behavior in a given fuel type is paramount in developing a community defense plan against wildfire. Fires in grass burn rapidly, but can be stopped by a roadway or plowed firebreaks. Fires in brush often burn with an intensity that prevents fire crews from safely applying water to the flame front. Timber fires can ignite new fires (called spot fires) miles ahead of the main blaze, hampering control efforts. Only wide scale pre-fire management programs can reduce the potential of a wildfire catastrophe.

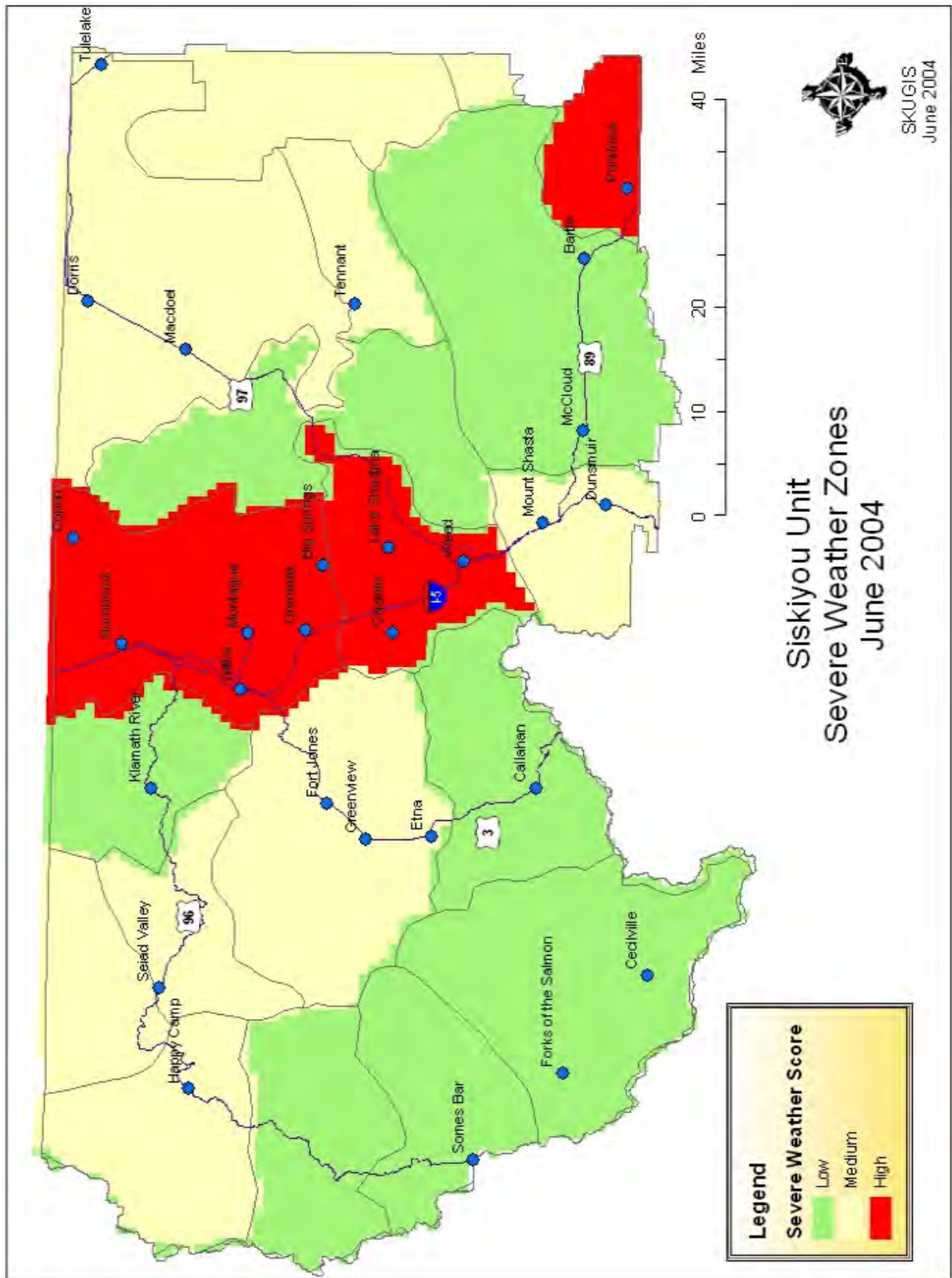
Another issue related to fuels that aren't figured into the Fire Prediction Behavior System, is housing density. The urbanization of California's wildland has resulted in a complex fire environment known as the "Wildland Urban Interface" (WUI). These areas of housing development in the wildland make it difficult for fire protection agencies to protect life and property. While the wildland firefighting community is trained to recognize and apply strategies to these areas, it remains at the forefront of the Siskiyou Fire Management Plan to educate the public to effectively assist in mitigating the risk. The majority of projects in the county are fuel reduction projects based in identified WUI areas, that meet the high-risk, high-value criteria of the California Fire Plan. These projects are detailed in the individual Battalion plans.



C. Severe Weather Assessment

Severe fire weather is defined using the Fire Weather Index (FWI) developed by the USDA Forest Service Riverside Fire Lab. The FWI combines air temperature, relative humidity, and wind speed into a one number score. This score gives wildland fire managers a baseline that helps indicate relative changes in fire behavior due to the weather (fuel and topography conditions are not included in the calculation). Severe fire weather occurs when the FWI exceeds a predetermined threshold. The threshold FWI is derived from average bad fire weather of approximately: 95 degrees F, 20% relative humidity, and a 7 mph eye-level wind speed. Frequency of Severe Fire Weather is defined as the percent of time during the budgeted fire season that the weather station in a given area records severe fire weather. Individual weather stations are ranked as low, medium, or high frequency of severe fire weather. This ranking can then be applied to the area on the ground represented by the weather station. These areas on the ground, called zones, are derived from the 1978 National Fire Danger Rating System zones established to rate fire danger in areas of common weather influence.

The weather assessment is an ongoing process. While the zones have been identified and the historic weather collected, the methodology is still being refined.



D. High-Risk/High-Value - The Assessments Combined

The ultimate goal of the assessments is to determine the high-risk, high-value areas of the County and apply pre-fire solutions to those areas where large damaging fires might occur. The fire planners have developed a method of weighting the asset values as discussed in the assets at risk section. After the asset values have been determined locally, the validated data for the other three assessments are brought into the formula.

Combining the four assessments: Level of Service, Severe Weather, Hazardous Fuels and Assets at Risk gives fire managers an overall ranking of the Q81st, 450 acre increments. The rankings are: **Very High, High** or **Moderate** and when displayed on a map, allow us to communicate visually with our cooperators, and the public.

Validation of the assessments used in the combined assets formula is an ongoing process. The **Level of Service assessment** is evaluated annually for changes in success rate and workload. The **Fuels assessment** is updated annually for changes in the fuel type, crown and ladder fuels, as brought about by timber harvest plans, fire or disease processes. The **Weather assessment** is monitored annually for changes in weather patterns, and weather station placement is evaluated to accurately capture severe weather days as they relate to fire control.

The following page contains the high-risk, high-value map for Siskiyou Unit.

